

# Water Treatment for Birmingham

ensuring Birmingham's water supply  
is always on and good to drink

by Jonathan Wagstaff & Jay Standen

The original water treatment works was commissioned in 1904 and is part of the infrastructure that supplies wholesome drinking water to Severn Trent Water's customers in Birmingham. The current £20m scheme provides resilience to ensure water quality standards are maintained in the future, and a new high lift pumping station to ensure that the customers continue to receive an uninterrupted water supply at the right pressure.



Successful completion of a typical pipe connection - Courtesy of Costain Ltd

## Supplying Birmingham

Situated in the outskirts of Birmingham and originally commissioned in 1904 the original treatment process consisted almost entirely of sand filters, but over the years as water quality standards and demands have changed there have been numerous modifications and additions to the treatment processes and the site now incorporates modern technology and processes.

## Scheme background

The existing contact tanks, built in the 1960s and 1970s require updating for which it would be necessary to take them out of service. To enable this to occur a new contact tank is under construction to provide additional capacity and allow work to be undertaken on the existing contact tanks. The existing high lift pumping station (HLPS) has provided many years of reliable service but is being proactively replaced to meet demand and provide a modern, efficient facility for many years to come.

## Procurement and development

Feasibility work commenced at the end of AMP4. The scheme was awarded to Costain-MWH as a design and build (D&B) project following a rigorous tendered selection process and follows Severn Trent's AMP5 procurement strategy. The D&B partnership developed the feasibility design, through outline design, introducing a number of innovations and risk mitigation measures and arriving at a construction target price of £20.2m. The project is now well into construction with the contact tank construction complete and due to be operational during March 2014 and the HLPS operational by December 2014.

## Third contact tank

The new 'third' contact tank is a reinforced concrete structure 80m long x 20m wide and 6m deep internally, substantially buried and built partially within an existing sand filter. It has been designed with the aid of CFD (Computerised Fluid Dynamic) modelling to





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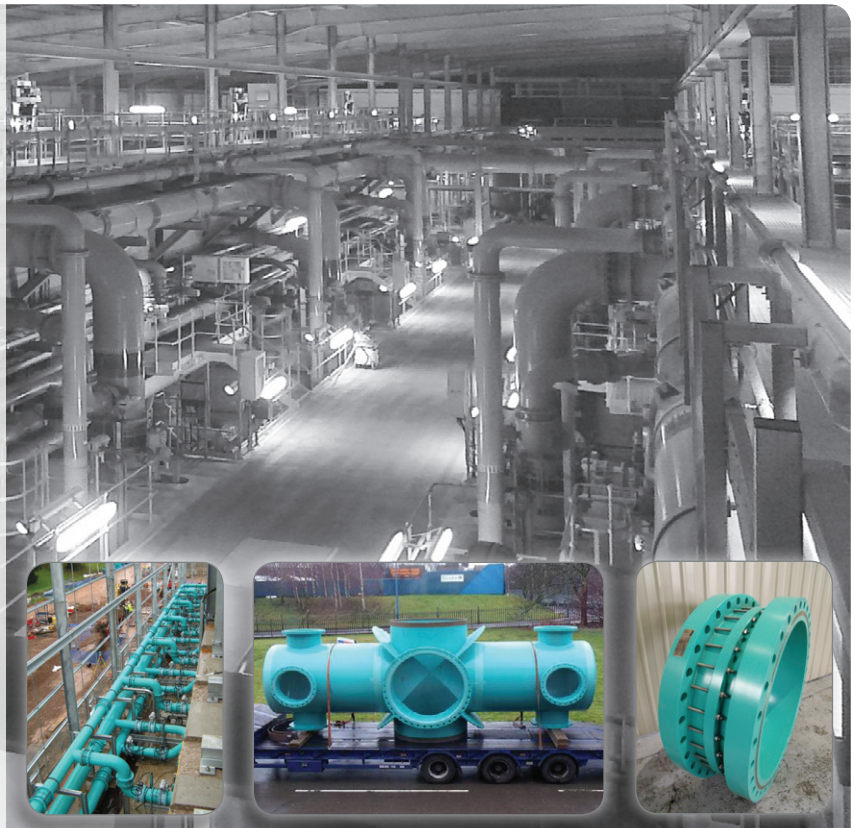
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Contact tank and HLPS under construction - Courtesy of Severn Trent Water Ltd

maximise hydraulic efficiency by promoting plug flow; it has also been designed to meet flexible operational requirements and allow future inspection and testing without taking the whole tank out of service.

Large diameter pipes have been laid to deliver flow to the new contact tank in conjunction with other supporting infrastructure to enable the contact tank and HLPS to come into service.

#### High lift pumping station

The new HLPS comprises a pump suction tank/wet well, a dry well containing the pumps and a superstructure providing a weatherproof and secure enclosure. The pump suction tank was modelled using CFD technology initially and then a 1:4 scale model was produced to refine the design and address any undesirable pump entry conditions. The pump arrangement has been designed to maximise efficiency and resilience against loss of supply.

#### Challenges

The development of the site over the past 100 years has entailed the laying of numerous services across and around the site at various levels and although there is a library of record drawings on site nothing can be taken for granted. Damage to any service or duct or pipe during excavation, could lead to a water quality failure or disruption to supply to a significant customer base which would be unacceptable to the customers, the client and the regulator.

The new pipework and modifications have to interface with the existing works and as such the making of connections presents the highest risk to affecting water supply and quality.

Rigorous planning, stakeholder management, mitigation measures and contingency plans have to be prepared and approved by a number of the client's internal organisation stakeholders in addition to the contractor's approvals months in advance of any

pipe connection work. The connection date is then set and failure to meet any of the requisite measures would result in the connection being aborted. The agreed connection date is also subject to network demand and incidents across Severn Trent's whole region which may also independently cause the connection to be aborted.

The most recent connection required a pipe stream to be isolated for 24 hours, and was successfully completed during a snowy night in April 2013.

Currently existing lead jointed cast iron mains have been partially exposed in preparation for planning two major connections to 100 year old original pipework. The mains were concrete encased so hydro-demolition has been used to remove the concrete to allow callipering and condition assessment. The condition of the mains and the joints has been found to be excellent – testament to the Victorian engineers.

Making connections to these mains with large steel diameter pipelines is the next significant challenge to the project.

#### Completion and commissioning

With the concrete structures in a well advanced state and pipe laying and pipe connections running in parallel, there still remains a significant M&E installation prior to bringing the contact tank into use in spring 2014 and completion of commissioning of the HLPS in winter 2014. All in all this will bring to the conclusion an exciting and challenging project providing improved resilience to the supply and quality of water to Severn Trent's valued customers in Birmingham.

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HLPS physical model  
Courtesy of Hydrotec Consultants Ltd



Typical buried services to be managed during excavation work  
Courtesy of Costain Ltd



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